

Indeed, this led to some real questions about health and safety. Geller found out that one out of every five had had an injury the previous year. Many of them treated it at home. Many of them said, "well, you know, it is too far to go, the medical facilities are elsewhere, there is no health insurance." So, for however serious it was people who should have seen physicians that did not get that kind of help.

Geller found that there was a significantly higher proportion of injuries among those who were most financially stressed. This is where we begin to make the connection between stress and behavior, i.e. injury. Those who had over 40 percent debt-to-asset ratio, which many of you know is a real bad thing to have—you are on the edge, going over—had over 60 percent of the accidents. That was true across age.

The younger you were, also, the more likely you were to have accidents, and when he asked these two questions that bear directly on our considerations here, he found very interesting results. He asked:

*Is it necessary, under current economic conditions, to cut corners on safety to save money?*

Of those who reported they had had an injury the previous year, 30 per cent of them said, "Yes, it is necessary to cut corners." Of those who had had no accident, only 20 percent said yes.

Then he asked, "Have you found it difficult to concentrate on farm work this past year?" Of those who had had an accident, two-thirds of them said, "Yes, I have found it difficult to concentrate."

We now find people who are concentrating far less on what they are doing. They have become much more distracted, much more thinking about the conversation with the, for example, **banker tomorrow**. Often what sets them off is a small thing.

Many of more I have interviewed have said to me, "You know, I went out behind the barn...", "I got a message from my banker...", or, "The feed dealer called me a liar," and then they would add, "And I took the gun and I . . ." These were the conversations I had after they had said, "I'll walk you to the car." Then they would say, "I've never told my wife this, but..." and then I would get the rest of the story.

We are seeing increased pressures on many farm families. Leslie Whitener of USDA on this program knows well the data that indicate the increased numbers of people with off-farm jobs. What was found in another study in North Dakota is fascinating with regard to the topic of increased stress from multiple jobs.

People who had identified themselves in one study as underemployed, were interviewed to find out how underemployed they were. What the researchers found out was the respondents were not at all underemployed. They were, in fact, under-compensated. Their incomes did not cover their expenses, but they were filled to the brim with jobs, pieces of jobs, part-time jobs, plus a farm. With both parents under such stress, the kids were under pressure also.

A friend of mine refers to this as a recipe for psychopathology. Another one of my friends simply says, "It's crazy making." Their commutes of the respondents were increasing distances from home with spouses often going opposite directions. They

were tired more often. They were cutting out a lot of social activity.

You who are medical professionals in this group know well—much better than I—the statistics that point out that at least 75 percent of all illnesses are stress-related. Immune systems seem to get weaker the higher the stress level.

Depression is known by another name—as "anger turned inward." Many of these folks could not figure out whom to be angry with, "and they turned it all in on themselves. Should we be surprised at high farmer suicide rates?"

I think it quite remarkable that with something like 650,000 farm families losing their farms in the 1980's that some people continue to insist that they were simply bad managers or speculators. Is it possible that so many got so stupid simultaneously? It seems to me that it is not really individual causation when numbers this extraordinary exit.

I not long ago spoke to a pastor in a rural community in which the bank had failed in about 1982 or 1983. He said to me, "Oh, you've got to know this, I am presently visiting nine terminally ill cancer patients in our community." That community probably does not have 200 people in it. You have to wonder about the relationship between such illness and the severe stress.

## THE RURAL COMMUNITY

The second context concerns the issue of the rural community. All you have to remember in my next illustration is "70 percent of the population of this country." I am going to use the same percentage. In 1890, 70 percent was rural; by 1960, 70 percent was considered urban; by 1988, 70

percent of the population of the U.S. was said to live within 100 miles of our coastlines the great emptying of America.

As a friend said the other day, "we are in the process of proving that the Homestead Act was a huge mistake." Rural communities are in crisis—that is no surprise to anyone. Many are declining. I think it must be rather hard to speak about the concerns of health and safety issues to folks who are living in increasingly declining, dysfunctional, despairing communities.

Poverty has been referred to earlier. Poverty is the cause of lots of things. How many of you saw the NBC story on tuberculosis last night? Did any of you say to yourself, "Wait a minute, in which century am I living?" "Increasing amounts of tuberculosis in this country related to what?" the announcer asked.

Poverty, became the answer. Migrant farmworkers are among those who are very much involved. And then there is the cholera epidemic in South America. Which century is this?

The poverty figures have increased and many of you know them well. There are also data available that speak to the increasing disparity in rural communities between those who have and those who have not.

One of the agencies in Washington put out the differences in food stamp usage in rural communities from 1980 to 1987.

While the Northeast, including New York State, was showing a decline, some Midwest states showed 47 percent, 31 percent, and 35 percent increases in food stamp usage.

I know people I interviewed whose kids were almost starving who would not on a bet ask for food stamps. So, we can assume that even with numbers showing increased use that they are being under utilized.

There has been, as you well know, institutional decline. When I thought I was about as depressed as I could possibly be about what is happening to rural America, I made the mistake of watching Tom Brokaw's exposé on Sunday night and discovered that the Mafia—give us a break out here—the Mafia, which controls the garbage routes in New York and New Jersey, have decided to dump it in rural America, and they have been found to drive their trucks and dump illegally in places as far away as Nebraska. Grandmothers in the hills of Eastern Kentucky are sitting and writing license plates and watching trucks owned by the Mafia. I do not think they know that this could be dangerous dump waste.

We had reference yesterday to the fact that Californians are eyeing the water in the Snake River. The point is, communities are increasingly in conflict.

Farmers who were encouraged and who thought it was a wise idea to trade more acreage for fewer neighbors are finding that they are not now as much better off as they thought they might be.

It is thought that fewer medical personnel are now needed since there are fewer people out there, yet many cannot afford to pay for the ones who are there. Many drive a greater distance to facilities. If you are very lucky, there are volunteer emergency medical technician who might rescue you from your farm accident—if you are lucky.

Rural mental health is in a shambles in many places. Rural mental health workers whose caseloads mount are inundated. I talk with pastors who tell me, "Judy, I am the only one in this huge territory that has any semblance of mental health training at all and one little old course in clinical pastoral education does not constitute being prepared to do serious psychiatry, but where can we send them?" What can we do?

Furthermore, at a time when we need more highly trained professionals in rural areas, they are less likely to come and to stay. Many of them are unwilling to subject their families to living so far away from some of the amenities.

Frankly, I am absolutely convinced that rural economic development will not take place without medical facilities being in place. I know of situations in South Dakota, where firm was ready to start up and discovered their they could not get liability insurance because the hospital had closed the previous year. Think of it. You see, the big pieces are beginning to come together.

While I applaud the notion of volunteerism, I am really opposed to allowing rural America to have "volunteers" and urban America to have real physicians and nurses. I am kind of picky about that, and I am operating under the notion that "equitable access to services" is a phrase that few politicians, if they were smart, would vote against; and the rest of us in the community need to rise up and say, "That's what's needed here."

I am not talking about a doctor in every community. I am realistic, but, folks, we cannot have rural health care in communities without trained personnel.

I wish to comment on one other aspect of the quality of life in rural communities. There was a meeting fairly recently where Iowa and Minnesota Agricultural Leaders of Tomorrow—the Kellogg Leadership Program—were in attendance. A leading agricultural economist from the University of Minnesota told the group of what he described as an efficient farming operation of the future.

I share this because I want you to wonder whether this is the kind of community in which you want to live. The suggestion was that a truly efficient farmer would, of course, have a lot of land because he would have large and expensive equipment over which to run it. The only way to make the equipment pay would be to run it 24 hours a day. All of our agricultural safety people are about to have an instant coronary.) That is not clever. It is not healthy. So, what was he saying?

He stated that you were not supposed to run it yourself, but you were supposed to hire people who would run it during the needed time, and when you had finished with them, you should fire them, ". . . and then they can go back on the public welfare system."

I do not accept that definition of efficiency in agriculture, and I do not think—and maybe you do not either—that it is possible to have healthy and wholesome and safe producers and workers that in such a community or in communities that are sick, declining and despairing. I think that is a very important issue.

### **GLOBALIZING AGRICULTURAL PRODUCTION AND CONSUMPTION**

If you have not read Wendell Berry's essay, "Does Community Have a Value?" in

his book, *Home Economics*. I strongly recommend it to you, especially as we think about the rural families and communities in a era in which the globalization of our food production system seems to be encouraged.

Policy makers in our world are bringing about the globalization of our food system. I point out to you that there is neither an invisible hand nor a mythical or mystical force that is dictating this; that it is, in fact, becoming a matter of public policy. It has been decided at the highest levels that this will happen.

I raise with you some questions about this because I think it is important in the context of the issue of which we are speaking. The consequences of this policy, however unintended, may not have yet been thoroughly discussed. The current operational definition of this globalization can be found in the General Agreement on Trades and Tariffs (GATT), and in the North American Free Trade Agreement (NAFTA). The destruction of locally regionally self-sufficient food systems in favor of a globalized system is being presented through these two treaties.

If we are to function globally, do we not then have to broaden our concern to include the banana packers in Central America who breathe chemical fumes all day in the packing plants; to the families of migrants whom I have seen living in the colonias on our border?

If these public policies come into being, how will they change the context in which American farmers, rural residents, and rural communities look at their quality of

life? Will the "harmonization" of regulations that is in the GATT mean a reduction in health and safety standards? Some are asking. I am not sure.

If we are to function globally, do we not then have to broaden our concern to include the banana packers in Central America who breathe chemical fumes all day in the packing plants; to the families of migrants whom I have seen living in the colonias on our border? This latter group is often U.S. citizens whose water comes from chemical barrels that are now used for rain catching. I saw that just a year ago, so it is still a contemporary situation.

Do we need to include the minority women and poor white women of North Carolina and other states who work in poultry plants? They go into the plant company healthy persons and within months some have developed urinary tract infections (from being not allowed to use the bathroom as often as needed), or they have developed repetitive motion syndrome (carpal tunnel) so badly that they are unable to lift their own children. As someone has said, "they come in healthy and they are dumped back on the public system crippled." Do we have to include them?

What about the cane workers who are imported with promises and hopes from the Caribbean (Jamaica) to work in the cane fields of south Florida. Many find recruiting promises go unkept.

Or the *campesinos* all across Latin America who work for three dollars a day or less. Our Missouri Agricultural Leaders of Tomorrow (Kellogg group) just returned from a trip to Brazil and Argentina, and my understanding is that the major thing they have had to cope with, since getting

home, is the despair about the obvious advantages Latin America has for producing the things we think of ourselves as so efficient at producing. Some of the outstanding young farmers say, "Hey, I might as well quit now." They may work through that, but how can American farmers compete with laborers who will work for three bucks a day. American farmers tend not to like to live so little. That is an issue of agricultural health and safety in every sense of the term.

We could go on. What about the Japanese farmers who are raising rice in the high mountain terraces are not very excited about our rice producers moving into their markets? (I raise beef and soybeans and of course I would love to get them to buy more farm products from the U.S.) However, if we force our rice into their markets, the economically more marginal producers in Japan (namely those growing rice in those mountain terraces) will likely not be able to raise rice as cheaply as some of our producers and they will go out of business.

What will then happen to the terraces that have conserved both water and soil for hundreds of years? Will they give way leading to soil loss and water quality loss? Now we are talking about a different issue, but one that clearly must be part of the discussion of the health and safety of agricultural producers and communities.

Well, as you can see, if we really decide as a matter of public policy to globalize the food system, can you and I then be comfortable with only focusing on agricultural health and safety at the national level?

The front page this week of Feedstuffs magazine talks about the opening of North America to "free trade." I am troubled by

the statement here that the Administration refuses, as the Congress has asked, to look at labor and environmental concerns involved in such trading arrangements. The Administration has indicated that these issues will not be discussed; they will not allow them to be discussed in the context of free trade negotiations. I suggest to you that this should be a cause of alarm for us.

We who are part of the community of faith, we who contribute millions of mis-

sion dollars to improve the lives of the poor, the exploited and the despairing of the world, we believe that we have an important stake in this enlarging issue of the health and safety of agricultural producers, workers and processors around the world. We are indeed your allies as all of us seek to improve the conditions of farm and rural families and communities here and abroad.□

## YOUNG FARMERS' PERSPECTIVE

Wayne Sprick  
Executive Director  
National Young Farmer Educational Association

Dr. Walter J. Armbruster: Wayne Sprick is the Executive Director of the National Young Farmer Educational Association. He will present his perspective from the viewpoint of Young Farmers.  
Mr. Sprick:

It is a pleasure for me to come before you and present the perspective of the National Young Farmer Educational Association and the young farmers we represent. This has been an informative session and conference. I am pleased to be part of it.

Before getting into my comments and reactions, let me take an opportunity to provide some background on myself and the organization I represent.

My background is in agricultural education. Prior to that, I was born and raised on a dairy farm in Missouri, Franklin County, the town of Washington. This is located about 50 miles west of St. Louis on the Missouri River. I went to school at the University of Missouri, Columbia, where I received a degree in agricultural science, in dairy science. At the time of my graduation, the job that I was looking for was not available. I chose to pick up the courses that were needed to be certified as an instructor of agricultural education.

Upon receiving that certification, I went to work in 1968 and taught for 19 years in two school systems in East Central Missouri. During that time I worked with secondary students, as well as adults, in agricultural education. This was through the Young Farmer Program, as well as general adult education. I also had the opportuni-

ty to teach part-time in a nearby community college.

During that time, I had the opportunity to buy a neighboring farm to my home place. Everybody involved in agricultural education has to put to practice what they preach. So, in addition to teaching, I owned and operated 120-acre general farm.

I have been involved with the National Young Farmer Educational Association since January 1987, during which time I relocated my family from East Central Missouri to Alexandria, Virginia. It was a culture shock, to move from 120 acre farm to a half-acre lot. We have adjusted quite well and the family is enjoying it.

Many of you are familiar with other vocational student organizations. There are three in agriculture. The Post-secondary Agricultural Student Organization (PAS), the National Young Farmer Educational Association, and the National FFA organization. In addition to these three in agriculture, you are probably familiar with the Distributive Educational Clubs of America, the Vocational Industrial Clubs of America, FHA, HERO. There are ten that are recognized as vocational student organizations by the United States Department of Education.

We provide opportunities relating to award recognition, leadership, and communication skills development for those students that are enrolled in agricultural education. The FFA addresses those needs of the secondary students. The PAS addresses the needs of those who are enrolled in the community junior college system generally in technical programs. We serve those needs of adults as they are enrolled in agricultural education.

Eighty percent of our membership is between the ages of 20 and 40. The term "young" is a relative term. If you would come to our Institute in Mobile, Alabama, in December and survey the group, you will certainly feel that way. I remember the very first Institute that I attended. I walked away from it and said, "Good grief, these are young farmers?" After doing some checking and research on it, I realized quickly that few people involved in production agriculture have the opportunity and resources of both time and finances to travel and to leave the farm for an extended period of time.

Those people who do are the older segment of the farm population. Those people who are required to stay home because of their tie to the business and the high requirement for family labor are the younger people. Also, the secondary reason is that our Institute is held the end of November and the first part of December. This coincides with the deer season in many states. Life is a matter of priorities.

The purposes of our organization are:

1. To assist young farmers to remain established in farming, ranching and agribusiness. This goes beyond production agriculture. You will note I said agribusiness.
2. To develop or to assist in developing resources that otherwise may not be available.

One of the programs that I am going to share with you was sponsored by Navistar International Transportation Corporation. One of the ways we were able to get those resources was that we could provide them with a program that was national in scope and related to our goals and objectives. These are to develop and to assist in developing leadership and communications skills, to provide identity and unity to the group.

It also helped to promote the National Young Farmer Educational Association as a vital part of the instructional program in agricultural education. One of the more important opportunities, as it relates to our purpose, is to improve the rural community as a place to live relating to health services and rural/urban relations.

How is this done? We are a member of the family of agricultural education. Our programs are administered and conducted by, on the local level, that instructor of agricultural education. Yesterday Bob Graham, representing the National Vocational Agricultural Teachers' Association, gave you a perspective on that group.

The primary emphasis that you picked up from that presentation was that they work with the secondary teacher. That secondary agricultural instructor many times is the advisor to the Young Farmer Association.

Agricultural safety has been a priority in all of our lives, mine as well, from an early age. I am not going to go into any of the things that I did as a child and young adult growing up on a dairy farm because at this



point it is unimportant. The perspective that the people in production agriculture, the farmers, have is that they are risk-takers. A high level of risk-taking exists in all things that they do. This relates to safety as well.

My life was impacted when I was a ninth-grader. A classmate of mine, Ken Kruse, was killed as a result of a farming accident. My life was also impacted when my brother sustained eye damage. He was working in a construction job between his freshman and sophomore years in college and sustained permanent eye damage. My life was also affected when my nephew lost an eye as the result of an object being thrown by a lawnmower that his father was using. And the list goes on. I too have sustained injury as a result of working in production agriculture.

The setting in the agricultural shop of the high school at which I taught was also an area where safety was important.

As we look at the opportunity for intervention as it relates to the reduction of injury and death from farm accidents, we need to reflect on some of the presentations that were made. We just heard a presentation on the relationship between knowledge and education versus faulty habits and attitudes as it relates to the occurrence of farm accidents. I said that farmers, as well as all the rest of us, have the knowledge and know the difference between right and wrong.

I have a 13-year-old son who is just starting to leave home and to go on his own to skiing trips and other activities with organizations, including our church group. When he leaves on these trips, I tell him, "Jon, I do not need to tell you what to do and what not to do. You know what is right

and what is wrong. What I need to tell you is that when you are faced with a situation, you take the time to stop and think, 'Is this right or is this wrong?' Weigh the circumstances and make the decision."

I used that same example when I was teaching agriculture. I would take my students to Columbia, Missouri, for the state judging contest and the state convention. I said, "If you do not know the difference between right and wrong, I have been a failure." In the case with Jonathan as a parent, or with my students I have been a failure as a teacher. What I am asking you to do is to stop and think and weigh the risks.

People involved in production agriculture are risk-takers. We assume risk when we plant the crop. What are the risks? We are not guaranteed what the weather conditions are going to be. We are assuming risk. We are not guaranteed what the price is going to be. We are assuming risk. We do the same kinds of things as it relates to safety. That kind of feeling comes through in all that we do.

At the same time, we in education provide programs and information that should help that person in production agriculture shift those risks. What do we have as it relates to price protection? The futures markets can be used as a hedge to shift that risk from the farmer to someone else. As it relates to weather, there are crop insurance programs that are available.

*What can we do as it relates to safety?*  
How can we help that person in production agriculture shift that risk or, better yet, eliminate that risk and be accident free?

Another important factor is awareness. We in the National Young Farmer Educational Association just completed a safety program called Board, EM II. This is a program that is conducted in cooperation with the FFA chapters across the country. We work closely with the FFA chapters, which provides for a good situation. The FFA chapters and those younger people are looking for opportunities to conduct community-service types of projects.

They have the means and work diligently in providing the legwork to get the information out. At the same time, those people out there in production agriculture, the young farmers as well as the not-so-young farmers, benefit from the reduction in accidents and the reduction losses resulting from these programs.

The Volatile Fuel Safety Program involved several areas. One of them was to reduce the accidents that result from mishandling and improper handling of volatile fuels, primarily gasolines. One of the reasons that this area was identified and initiated in the mid 1980's was that people were keeping tractors longer because of the economic situation. They were also keeping the tractors in a poorer condition and a lower level of repair and maintenance.

The other thing is that these tractors were manufactured in the early 1970's, the 1960's, and the 1950's. We even found some that were manufactured in the late 1940's. The specifications under which they were built were for the product that was being used and manufactured at that time. Now they are being operated on gasolines that are manufactured primarily for our cars of today, with the different octanes and volatility levels.

Tractors are being used for heavier operations than they were manufactured for. This causes a higher level of heat.

The FFA chapters and those younger people are looking for opportunities to conduct community-service types of projects.

The Board EM Program emphasized three major areas: instruction, awareness, and the opportunity to update and check equipment to keep it in proper operating condition.

The awareness aspect of the program was addressed through decals placed on fuel tanks and the storage tanks, as well as the tractor, itself. This called attention to the idea that when you work with these fuels, you, as the farmer, know the difference between the proper way and improper way of fueling this tractor. It is up to you to take the initiative to exercise the proper practice and to follow through.

This program was sponsored by Navistar International Transportation Corp. Their primary interest was to reduce their risk and exposure relating to these kinds of injuries. As we were seven months into the period, incidence and injuries was reduced considerably.

The Young Farmer Educational Association presently is looking at other areas and thrusts for safety programs. Among other things, this conference is providing me with names of resource people that I will be contacting in the future to help us identify thrusts and available information and resources.

I mentioned that the opportunity and the purpose that we have in addressing the awareness aspect of safety is important. The decals that were placed on the machines were printed and distributed in English and Spanish, as well as French for the Canadian provinces.

I would like to react to some of the things that have been presented. One of the purposes for my being represented at this conference is, What can we as a vocational student organization bring to the table? What can we do to help in reducing the incidence of accidents and death?

I heard the statement made yesterday that there needs to be a bridge built between the professionals and the farmers. I see this as being very important. I mentioned that farmers are risk-takers. We have heard, also, that farmers are people who listen to farmers.

They tend to stay within their own groups and to rely on their same kind for information. This is an opportunity for us. We need to direct our attention to how behavioral changes can come about and be part of the solution.

Most effective learning occurs when there is activity involved. *Learning by doing* is one of the lines of the FFA motto. We need to provide the opportunity for positive reinforcement. People involved in production agriculture are students, regardless of their age. They need to have the same opportunities for positive reinforcement as our high-school or elementary students.

We at this conference are **not** going to be made effective simply by what we have heard. We need to take it with us. We need to involve the people back at home.

Teaching values and behavior to our kids at a very young age is important. This is where we develop the habits like to use the seat belts.

When our first-born, Jonathan, came home from the hospital in 1978, he was in an infant seat utilizing the seat belt. Irene and I decided that this was going to be a priority. Now Joel, who is our 5-year-old, gets in the car and we drive just a short distance; he wants to be buckled. These are the kinds of habits we need to work with in production agriculture as well.

We have heard throughout this conference that children are a very at-risk population. We need to address that risk.

I will be here during the remainder of this conference. If there is not the opportunity during one of these sessions to ask questions, I would be more than glad to visit with you on an informal basis.

In closing, I would like to point out that when addressing the opportunity for improvement and the reduction of farm accidents, it is important that we know the people with whom we are dealing. I have a very serious concern about the low numbers of people involved in production agriculture attending this conference. I can understand the reason for it when we consider the date of this conference.

On the positive side, however, we are having an excellent opportunity to gain the perspective of the Surgeon General as it relates to agricultural safety. Now it is up to us to take this information and to see that it gets to the place where it can be effective. Thank you very much.□

## FARM FAMILY BEHAVIOR PERSPECTIVE

By Robert Aherin, Ph.D.  
University of Illinois  
Professor, Department of Agricultural Engineering

My presentation will focus on farm family behavior and the issues surrounding effective safety and health behavioral change among adults and children. I will comment on some of the issues that I heard today and yesterday during this conference that relate to behavioral change. I will also review some additional issues for consideration in looking at behavioral change concepts in dealing with the very complex safety and health issues that face production agriculture in this country.

My research activities have focused on analyzing and predicting various safe work behaviors among farm populations through the application of social behavioral psychological models. I have conducted studies involving dairy farmers, pesticide applicators, and child safety behaviors on farms.

There has been a lot of discussion at this conference concerning the uniqueness of agriculture as it relates to occupational injury and illness problems. This has included the variety of occupational hazards that farm workers have to deal with; the variations of economic status among farmers and farm workers; the diversity of work activities on farms; the periods of high physical and emotional stress; the extreme environmental conditions that farmers often work under; and their limited access to emergency care.

Yesterday we had the opportunity to hear, in this session, a number of very good presentations on ways and means to heighten

awareness and knowledge of farm safety among farm populations. Some of the methodologies discussed included group presentations; using the media effectively; exhibits; demonstration activities; and learning through interaction. Furthermore, the importance of networking among organizations for the purpose of sharing expertise and resources to address farm safety and health issues was addressed.

### THE 4-H PROGRAM

Before I continue with my primary topic, I was asked to describe the 4-H program in this country for the benefit of those who may not be familiar with 4-H. As a member of the Cooperative Extension Service staff at a land grant university, I work closely with 4-H.

The 4-H program is another major mechanism of reaching youth, particularly with agricultural safety and health information that some of you may not have traditionally been involved with.

It is part of the Cooperative Extension System and the United States Department of Agriculture. 4-H combines the cooperative efforts of youth; volunteer leaders; state land-grant universities; Federal, state, and local governments; and the U.S. Department of Agriculture.

The mission of the Cooperative Extension System in conducting 4-H programs is to assist youth in acquiring knowledge, devel-

oping life skills, and forming attitudes that will enable them to become self-directing, productive, and contributing members of society. 4-H's goal is to create a learning environment for youth that is stimulating to the development of life skills in three areas:

- ▶ First, competency and knowledge.
- ▶ Second, coping and dealing with stress in their daily living.
- ▶ Finally, being contributing individuals of society by learning the importance of helping others.

4-H programs are also internationally involved. In addition to the United States, it is carried out in 82 other countries in the world. Our country was and is a model for 4-H programs throughout the world.

In the United States, there are currently about five million youths involved in 4-H programs. Only 13.7 percent, or about 700,000 of the five million youths involved in 4-H, live on farms. Approximately 38 percent of 4-H members live in towns under 10,000. About 20 percent of 4-H members live in cities larger than 50,000.

Girls make up about 53 percent of the members. Sixty-six percent of 4-H members are between 9 and 11 years of age; 23 percent are between 12 to 14; and 10 percent of the members are between 15 to 19 years.

The 4-H program is operated primarily through volunteer leaders. There are staff located at the county or local level, and state staff that help facilitate programs throughout each state.

A national staff coordinates programs at the national level. But, primarily, 4-H nationwide is made up of over 519,000 4-H adult leaders and 125,000 junior and team leaders.

4-H volunteers on the average donate about 220 hours per year preparing club meetings and teaching youth. Thus, for each hour a salaried staff person spends in 4-H, a volunteer spends about 12 hours of time with 4-H members.

Safety is taught through specific projects on safety topics and as part of other projects. Members also have an opportunity to be involved in community safety activities. Thus, 4-H is a major organization that has deep roots in rural areas that can serve as a significant communication link on farm safety issues.

## USE OF EDUCATIONAL MEANS

Now, to go back to my primary topic. I think it would be good to look at some of the issues or statements that have been made by several of the speakers in the last couple of days that relate to using various educational means to change safety behaviors. I would like to discuss the need to evaluate the effectiveness of educational efforts to influence safe work procedures and relatively new methodologies by which this can be accomplished.

For example, on Tuesday, Dr. McGinnis, when speaking on the topic of disseminating safety and health information through educational means, stated that "education alone is not enough." The physical environment must be changed.

Further, he stated that there needs to be a balance between health promotion and health protection. We need to know the

facts. We need to build coalitions to do this job. "Knowledge and attitude change may not be sufficient" was another statement that he made.

Dr. Sullivan, Secretary of Health and Human Services, stated that more extensive educational programs can be effective in reducing occupational injuries and illnesses in agriculture. I would say, yes; but there are some qualifications, and I will discuss those here in a minute.

Dr. William Roper, the Director of CDC, made some statements that we must be able to measure progress with our intervention programs. We must deliver successful programs.

Finally, Dr. Myron Johnsrud, Director of USDA Cooperative Extension Service, asked a couple of very good questions. He asked, "Why are educational warnings going unheeded?" Additionally, he asked, "What intervention programs are needed to be effective?"

I have worked as an agricultural safety professional for over 17 years involving positions at the University of Minnesota and now at the University of Illinois. A very significant portion of my program involved developing and implementing safety education programs for farm workers and farm family members.

Normally the success of these programs was measured by how many people were contacted and how many programs were offered. It was assumed that those exposed to farm safety information through some type of educational program would become aware of the risk, would learn how to minimize or avoid the risk, and then would take action.

As I grew in my professional career, some of my concerns were, How do we know if our safety educational efforts are effective? Are we really changing the person's behavior with educational programs? How can we do a better job of that? These concerns inspired me to explore these issues.

Mr. Graham stated that there were four steps needed to be effective in our programming efforts. These include identify needs, develop objectives, take action, and evaluate the results. I basically agree with these four points. The problem is that we have not been very good at achieving them.

### **Identifying Needs and Evaluating Results**

Let us focus on identifying needs and evaluating results. Some of the measures typically used to accomplish these would include looking at injury and illness data to learn where some of the problems are in order to direct some of our efforts.

Once educational intervention programs are implemented, we evaluate to see if there has been any change in the injury or illness data over time. There are some significant limitations in using injury data to evaluate safety intervention programs in agriculture.

Such data can provide us with a lot of information on what some of the contributing factors are to agricultural injuries and illnesses. But utilizing injury and illness data for evaluation purposes is basically a long-term measure.

Normally, it takes five to ten years for most farm safety issues to see if there has been any significant impact. This is because there are so many factors such as

sociological, environmental, and economic that can influence injury and illness rates.

For a variety of reasons, educational programs have been the primary intervention means to reduce injury risk in production agriculture. This is due to the limitations that have faced other general intervention efforts.

Furthermore, injury data is a very poor measure in small geographical locations. This is because during the short term there are very few cases to evaluate. The injury rate in a given area may drop by 10 or 15 percent from one year to the next just because of natural fluctuations.

There are significantly fewer laws and regulations that are directed at the safe work activities of farm workers compared to workers of most other industries. Federal and state regulations have been limited for a variety of reasons. Some of these include

- The lack of a concentrated work force—farms are generally small operations in most areas of the country that employ few people at one location. This makes it difficult and costly to effectively enforce safety regulations.
- Unorganized work force—most workers in agriculture are not organized. Labor unions in other industries have been a major factor in the promotion of safe work places through work contracts and through support for state and federal regulations for their members.
- Independent nature of farm operators—most farmers do not like to be told what to do. They tend to want only minimal outside intervention into their livelihood. Thus, most farm organiza-

tions have not favored laws and regulations directed at farming operations.

Probably the most effective means of injury control is the providing of automatic protection of workers from agents of injury. This is basically accomplished through the design of equipment and processes to eliminate or reduce the potential for injury by users. While the manufacturers of farm equipment, structures, and processes have made major advancements in safety design these improvements are rarely passed on to existing equipment or processes.

Most industries have guidelines and requirements for retrofitting older equipment to bring it in line with current safety technology. This is generally not practiced in agriculture at this time. Farmers often see little economic incentive to retrofit older equipment.

Thus, these are some of the basic reasons why the agricultural industry has traditionally relied so heavily on safety educational measures to reduce injury exposure. While in the future it is envisioned that a greater utilization of other injury control measures might be used in agriculture, education will continue to play a major role. It is imperative for this reason that more effective means to utilize educational intervention efforts to influence safe behaviors of farm workers be sought.

Many of the safety and health intervention programs of the past have been developed on the basis of what we "think" will work rather than what we "know" will have the greatest impact. I believe that there are new theories and models for evaluating social behaviors that can be helpful in delineating the intervention need in agricultural safety and health.

These models potentially could define safety and health issues to the point of providing direction for the development and use of educational measures. Additionally, these analyses could identify the limitations educational measures may have in effecting positive safety change for some issues.

Much of safety educational efforts of the past focused on changing attitudes with the belief that attitude change would result in behavioral change. As Dr. Elkind pointed out in her presentation at this conference, studies conducted in the late 60's and 70's found little or no correlation with this hypothesis.

It has been learned in recent times that attitude measures do not correspond with behavioral criteria. The early attitudinal studies would evaluate a very general behavioral statement. An example of this would be when evaluating the potential purchase of a roll-over protective structure (ROPS) on a tractor a subject might be asked to evaluate a statement such as, "Roll-over protective structures are \_\_\_\_."

Behavioral psychologists have learned that many of the low correlations of attitude measures with the actual behavior are because the statement is directed toward the object of the behavior rather than the behavior itself. Thus, if researchers are interested in predicting behaviors through an attitudinal measure, the attitudinal measure must be directed toward that specific behavior, not the object of that behavior.

A more appropriate evaluative statement for predicting ROPS purchasing behavior would be to ask farmers their attitude toward buying roll-over protective structures. The attitude question would

look as follows: "My buying a roll-over protective structure in the next two years for one of my non-ROPS equipped tractors is \_\_\_\_."

The attitudinal question must match the corresponding behavioral criterion in terms of 1) action, 2) target, 3) context, and 4) time. In the previous example the action was "my buying," the target was "ROPS for one of my (the subject) non-ROPS equipped tractors," the context was "general," and time was "within the next two years."

In summary, there may be a substantial difference between people's attitudes toward objects (in this example, ROPS) and people's attitudes toward behaviors associated with objects (in this example, buying ROPS). To predict behavior, this distinction is crucial.

One of the prominent social psychological models for behavior prediction and analysis is the Theory of Reasoned Action that was developed by Fishbein and Ajzen.<sup>12</sup> This theoretical model took the question of behavioral prediction many steps further than models previous to it by adding various concepts to the analysis of social behaviors. Figure 1 illustrates the various components of the model.

The ultimate goal of this theory is to understand human behavior, not just predict it. This theory has proven that intention is strongly correlated to one's behavior and behavioral intentions are formed by two basic determinants, one personal in nature and the other reflecting social influence.

The theory of reasoned action predicts a behavior (box number 1 in Figure 1) by asking individuals whether they intend to



perform a specific behavior (box number 2). This "intention," in turn, is determined by two components: attitude and subjective norm (boxes 3 and 4 respectively).

The attitude component, as expected, analyzes a person's attitude toward the behavior, while the subjective norm component analyzes the amount of pressure a person feels from significant others to perform the behavior. Both of these components are predicted by qualitatively different beliefs (boxes 5 and 6 respectively).

By comparing the beliefs of intenders to non-intenders, the researcher can see what beliefs need to be changed in order to change the behavior of the unsafe farmers. An advantage of this model is that it provides very specific recommendations on

how to change specific behaviors, based on the farmers involved with those behaviors.

Within populations for specific behaviors, some will be more affected by their attitudes while others will be more affected by social influences. Furthermore, others will be equally influenced by both attitudes and social influences. Through the statistical analysis of the model one can learn what portions of the population are affected by the various determinants of the behavior being evaluated.

I have tested this model in a study conducted among a population of Wisconsin dairy farmers and Illinois pesticide applicators. The predictive ability of the model showed positive results in both of these studies. However, this theory needs to be further tested on farm populations.

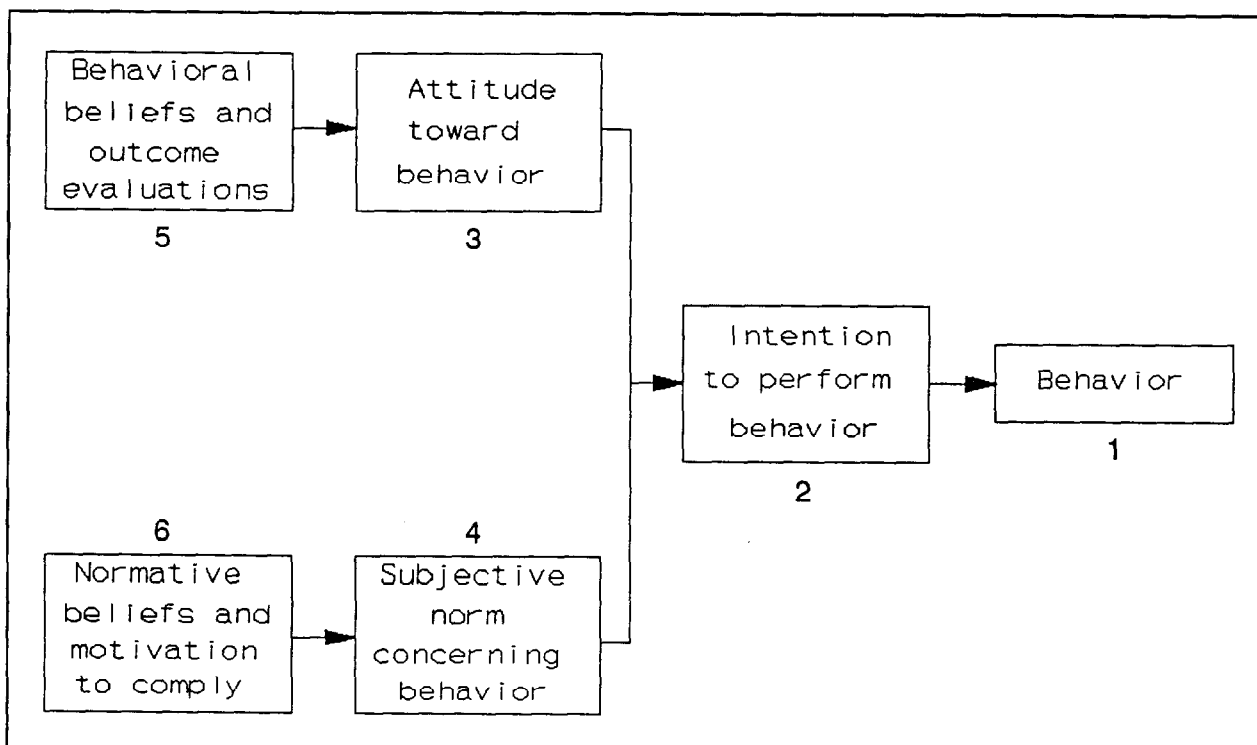


Figure 1: The Theory of Reasoned Action.

I believe the Theory of Reasoned Action and other behavioral models that have been developed from it can be significant tools in identifying the attitudinal and social beliefs that need to be modified in order to change behavior. This level of analysis can provide strong insights into whether the behavior being evaluated can be significantly affected by educational interventions or if other types of interventions will be necessary, such as economic incentives or design changes in equipment or processes.

An example of an issue that might benefit from Theory of Reasoned Action type of analysis would be the installing of ROPS on tractors. Tractor roll-overs are a major factor in farm work-related deaths.

It is well known that if a tractor has a ROPS it almost eliminates the death potential in a tractor roll-over incident. But only about 30 percent of the farm tractors in the United States have a ROPS. Thus, at issue is what it would take to persuade farm tractor owners to install a ROPS on non-ROPS tractors.

There have been significant educational programs to promote the purchase of ROPS among farm tractor owners. But there has been no significant increase in the retrofitting of ROPS on non-ROPS equipped tractors.

If an analysis was conducted among US farm tractor operators utilizing the Theory of Reasoned Action, one could learn what intervention initiatives would be necessary to effect a significant change in this behavior.

For example, it could be learned how much if anything farmers would be willing to spend for a ROPS, their general percep-

tion of the need for ROPS on their tractors, tractor use problems that they may encounter with ROPS, and so on. This type of information would provide focus for initiatives to deal with this issue rather than using the traditional "shotgun" approach of trying anything and seeing if it works.

Additionally, an analysis of this nature can be conducted once intervention has occurred to determine if any behavioral change has developed. Thus, it has potential to serve as an excellent evaluation measure.

In conclusion, given the current restraints that safety and health professionals in agriculture must work under it is imperative that we identify and utilize intervention measures that are capable of self-motivating farmers and farm workers to adopt safe work practices. We must strive to improve our ability to accomplish this.

There has been practically no systematic evaluation of the effectiveness of agricultural safety and health education, legislation, or engineering intervention efforts to prevent or control agricultural injuries in this country. It is essential that agricultural safety and health professionals from all disciplines undertake scientific evaluations of their efforts to effectively reduce the risk of agricultural injuries and illnesses for the farm populations that they serve.

As previously stated, several practical and cultural considerations suggest education-oriented intervention approaches will continue to be an important option for the prevention and control of agricultural injuries and illnesses. But I am very concerned by the thousands of dollars and hours that are spent on agricultural safety educational programs without seriously

evaluating the potential effect that such efforts will have on the issues being addressed.

The recently developed theories of social psychological behavioral analysis and prediction show promise for providing researchers and educators with a more comprehensive understanding of safety and health-related behaviors among farm populations.

Agricultural safety and health professionals need to become more familiar with recent

concepts of applied behavioral analysis. A limited number of research programs should be supported that apply social psychological behavioral analysis to selected agricultural safety and health issues of national importance. One of the primary purposes of these studies would be to further validate the utilization of these types of analysis for addressing agricultural safety issues.

Agricultural safety and health issues are some of the most complex of any industry. We must continue to strive to identify means that are effective in addressing these issues so as to preserve the valuable human resources who are involved in production agriculture.□

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## **SURVEILLANCE - AGRICULTURE-RELATED DISEASES, INJURIES, AND HAZARDS**

*By Henry A. Anderson, M.D.*  
Chief, Section of Environmental Epidemiology  
Wisconsin Department of Health and Social Services

Dr. Richard A. Lemen: Our first speaker will sum up the session on *Surveillance - Agriculture-Related Diseases, Injuries, and Hazards*. Our speaker, Dr. Henry Anderson, is the Chief of the Section of Environmental Epidemiology with the Division of Health in Madison, Wisconsin. Dr. Anderson has a medical degree from the University of Wisconsin and received his bachelor's degree from Stanford University. Dr. Anderson:

Over the past several days, we have experienced some stimulating discussions and presentations. What stands out are the vivid images that have been evoked.

We are all now familiar with the theme of the movie *Field of Dreams*; we have heard all about "belltollers." We can clearly say that this conference, among all conferences, has definitely overcome the "vision thing."

### **THE TIME HAS COME FOR ACTION**

Our session was to address surveillance of agriculture-related diseases, injuries, and hazards. I think we confirmed that the time has come for action; that there is a crisis of disease, injury, death, and disability on farms and in farm families.

We need to move away from the broad view to some specific, high-priority activities.

Our challenge is, "Why can't we prevent these events from happening in the first place? Why haven't we, and why can't we?" What is critical to accomplishing the

goals is that a coalition is forming, and it is forming around the common interest of concern and support for the prevention of agricultural injury and disease.

### **SURVEILLANCE IS ESSENTIAL TO PREVENTION**

As you might expect from our group, we feel surveillance is essential to prevention. We discussed that the role of surveillance and prevention has four main goals.

- ▶ The first is the ability to recognize and identify problems. We have certainly done that through existing programs. We have heard this week about the many problems that do exist.
- ▶ The second activity of surveillance and prevention is defining the scope of the problem. In many instances, we are in the process of trying to do that, but we also need the second step to continue that.
- ▶ The third is to target interventions. Right now we are in the process, for many diseases and injuries, of trying to target where we can get the most bang for our buck.

- The fourth role is in evaluating the efficacy of interventions.

For many conditions we are at different surveillance stages in this scheme. For one condition that we have heard much about, that of farm fatalities due to tractor roll-over, we have identified the problem, we largely know the scope of the problem, and we know what needs to be done to target interventions.

We also have heard this week that we have not been very successful. Surveillance information is continually telling us that our programs are not as effective as we would like and that we need to bring our coalition together to control these problems.

We discussed a number of issues: hearing loss, skin cancer, acute pesticide poisoning, and respiratory illness. All of these are problems that need to be addressed, and surveillance can assist us.

### **TASKS CAN BE ACCOMPLISHED BY A COALITION**

We also discussed defining the coalition. We all have a fuzzy, warm feeling about a coalition, but we really need to begin to define what it is and who it is. We need to involve government at all levels—that is, the Federal government, state governments, local governments, and county governments.

There is a critical need to have industry involved. They are key actors and players to help us intervene.

Communities also need to be involved. Both the academic community and the community of the voluntary organizations that represent individuals need to be involved.

We also heard of a need for grass roots effort. We need to have individuals involved. The individual farm family must be committed to this activity and participate.

The coalition needs to identify a set of conditions and hazards for surveillance. We need to move away from the broad view to some specific, high-priority activities.

### **THE NEED FOR PRIORITIES**

Our session participants determined that an initial task of the coalition must be to establish surveillance priorities and to provide support to build the infrastructure necessary to carry out the surveillance programs.

- Therefore, first we are proposing that within 60 days the Surgeon General make every effort to identify resources for a workshop of coalition members and that agricultural disease and injury experts come together to identify conditions for surveillance.

- Second, after that group has come together to identify candidate conditions, that within 180 days the Surgeon General make every effort to identify resources for a workshop, which will take up the candidate conditions involving all levels of the coalition. We have, over the past several days, identified and spoken of a number of candidate conditions in our group, including farm fatalities and the more serious injuries.

Of course, we talked about roll-overs, but also we have to be concerned about amputations and loss of eyes. Skin cancer, repetitive trauma, hearing loss, and especial-

ly respiratory conditions, also, must be considered as candidates.

### **CANDIDATE SURVEILLANCE PROGRAMS**

We also discussed various types of surveillance programs. Once these candidate conditions are identified, we must begin to move forward for the establishment of surveillance. A situation such as the need for continued coding of death certificates for industry and occupation, as well as that portion of the death certificate that indicates whether the fatality is work-related or not, is one candidate surveillance system that could be easily implemented.

We also need to begin additional surveillance at the local level by health and safety practitioners. Another example would be in-depth case investigations of individual fatalities or individual diseases by health and safety experts.

Lastly, and parallel with this activity, we recommend that the Surgeon General and the coalition, together, need to move forward to identify resources for the further development and support of the infrastructure that is necessary to carry out this mandate.

In conclusion, our group did feel that we have a vision, but we do not feel that it is visionary but rather that it is practical. Prevention can be accomplished, if we are all committed to achieving the goals. We feel that this conference is the first step in getting a coalition formed and allowing us to begin to make that commitment to move beyond all of the activity that is currently ongoing and to make additional strides for the prevention of disease and injury.□

## RESEARCH - CHEMICAL AND BIOLOGICAL HAZARDS

By Kelley J. Donham, D.V.M.

Professor, Department of Preventive Medicine and Environmental Health  
University of Iowa

Dr. Richard A. Lemen: Our next speaker this morning will be talking about the findings and the recommendations of the sessions on *Research - Chemical and Biological Hazards*. To do that is Dr. Kelley J. Donham, who is a veterinarian who received his degree from Iowa State University and his undergraduate and master's degree training from the University of Iowa. Dr. Donham:

Steve Olenchock, the rapporteur in our group, and I worked for several hours last night to summarize the kinds of messages that came through over the past two days in our group. We felt we could best summarize those ideas in about three different topics.

- ▶ Number one, there was a special spirit that transcended throughout the session that can best be described by a combination of urgency, enthusiasm, and commitment.
- ▶ What I want to talk about second is specific facts that were mentioned in regard to particular agents of disease and the gaps in the knowledge that were identified.
- ▶ The third topic I want to discuss is the need for a coalition to address the issues.

This was a group that was quite large. We usually had over a hundred people in the room, very interactive, and I think it was a very exciting group to be with.

### GROUP SPIRIT

Regarding the spirit of this group, I would like to try to demonstrate this through a model diagram of a nerve synapse. The spirit that we felt contained enthusiasm, commitment, and goal direction.

The spirit really was something that was sparked or initiated back in 1988 when there was a conference here in Iowa, entitled "Agricultural Occupational and Environmental Health: Policy Strategies for the Future." This conference resulted in *A Report to the Nation*, which indicated that there was an urgency, a feeling of urgency, about this whole issue.

I believe since 1988 that urgency has transcended into even a greater and broader enthusiasm and commitment demonstrated here at this conference. Clearly, the neurotransmitter substance here was Dr. Novello's enthusiastic communication to us of her commitment to this public health problem of agricultural safety and health.

However, in the background there is the question about the reality of this commitment in the years to come. The momentum, will it continue? The fact is that the changes, the actual reduction in injuries and illnesses that we hope to see, will take time and will take long-term commitment.

One of the items that came out of the group was a call for a sustainable human resource in agriculture. This was based on an analogy to the sustainable agriculture movement from a natural resources conservation perspective.

Perhaps one of the aspects that has not been thought of or put into the equation of sustainable agriculture is that we must have a sustainable human resource. We need a sustainable human resource that is as free as possible of illnesses and injuries from an economic standpoint as well as a humanistic standpoint.

## FACTS

### Dust-Related Diseases

Moving now from the spirit of this group to facts, Suzanna Von Essen reviewed some of the major respiratory diseases resulting from exposure to agricultural dust: bronchitis (both acute and chronic); occupational asthma; organic dust toxic syndrome; mucous membrane irritation; hypersensitivity pneumonitis; and classical allergies (rhinitis and asthma). These are placed subjectively in order of importance, as I interpreted from the discussion and from the presentation. I also noted some gaps in knowledge brought out in the discussions.

There were questions about the sequelae of repeated acute exposures or acute episodes of organic dust toxic syndrome, acute bronchitis, or hypersensitivity pneumonitis. What are the long-term and outcome sequelae? They are unknown. This is where additional research is needed.

There was considerable discussion in regards to agents of agricultural respiratory disease. The exact agents are unknown, as are the specific mediators that result in the biological conditions that are seen.

The difficulty of differential diagnosis was mentioned several times. It is not easy to differentiate between organic dust toxic syndrome and hypersensitivity pneumonitis

and a complex such as a combination of chronic bronchitis combined with hyper-reactive airways disease. To sort those out, the clinician at the community level needs help in regards to training and newer and more specific diagnostic tools.

**Treatment:** It is not entirely certain from the physician's standpoint as to what is the best treatment for these agricultural respiratory ailments. We know that protection, perhaps, is the best answer; but when a clinician is faced with these problems in his or her office, what is the best treatment?

Fifty percent of the pesticides that are in use show some potential for carcinogenicity.

**Children:** There are questions about children who are exposed to these environments at an early age. What are the issues and problems involved? Are they more prone to allergies? Are they susceptible to inflammatory agents and long-term sequelae? It is not known.

### Pesticides and Fumigants

Aaron Blair had the topic of pesticides and fumigants, and he outlined his presentations emphasizing chronic outcomes in four areas: cancer, immunologic, neurotoxic, and reproductive. He concentrated primarily on the potential relationships of pesticides to cancer, because that is where most of the research has been done.

Fifty percent of the pesticides that are in use show some potential for carcinogenicity, based on a variety of different kinds of bioassays, and they seem to span



the classes of pesticides that are used, including insecticides and herbicides. Even though farmers have lower overall risks for cancers, there are certain cancers that they have increased risk for, including reticuloendothelial cancers, multiple myeloma, lip, prostate, and soft tissue sarcoma among others. Perhaps, in terms of the evidence relating pesticides to cancers, non-Hodgkin's lymphoma seems to have the strongest relationship.

**Immunologic Concerns:** Perhaps one of the most interesting facts that was brought up was that non-farm populations of immunosuppressed individuals seem to have similar patterns of cancer as farmers. There are a host of neurotoxic problems that are at least, I guess, beginning to be associated with pesticide exposure, but they are not really well-known at this point. Then, certainly, there are certain pesticides that have some effects on both male and female reproductive outcomes.

Perhaps one of the major gaps that was noted was the need for a well-controlled, long-term prospective study; perhaps this is one of the major ways to try to find out some of these associations.

### Infectious Diseases

Dr. Russell Currier had the assignment of discussing infectious diseases. He discussed these in four different categories: interpersonal, food-borne, vector-borne, and other zoonoses.

In terms of interpersonal infections, he noted that there are certain diseases that have been rare in the past, but are very prevalent in certain farm populations. Tuberculosis, for example, is 300 times more prevalent in the migrant farm population than in the white population.

Polio and rubella have been noted in the Amish population. Enteric diseases, generally speaking, are more prevalent in the migrant and economically deprived groups. There is a problem with a combination of socioeconomic status and cultural situations that clearly influences the disease pattern within this population.

There are occasional outbreaks of a whole host of food-borne diseases within farm family populations, because of their particular food preparation methods and use of food from the farm. Examples include *Campylobacter*, *Listeria*, *Salmonella*, and trichina.

Perhaps one of the most interesting facts that was brought up was that non-farm populations of immunosuppressed individuals seem to have similar patterns of cancer as farmers.

Vector-borne diseases still crop up as occasional problems, e.g. plague, Rocky Mountain spotted fever, equine encephalitis, California encephalitis, and even malaria in certain areas.

Zoonoses, in particular tetanus, were noted. We still do have tetanus, and the fact is that the immunization status of our population is not as complete as we would hope it to be.

Bovine tuberculosis has shown up again from other species besides cattle. Llamas and buffalo are species that can harbor the infection and reintroduce it to the cattle population, which may in turn expose the farm population. Then, finally, rabies is still a problem and will be a problem for many years to come.